TSW 2

User's Guide

t.e.i.

Thomas Enterprises, Inc.

www.thomas-superwheel.com

Thank you for purchasing a TEI sim racing controller. We are confident you will find your new controller to be of the highest quality and precision because that is our focus. Our wheels are built to last, using quality materials and workmanship.

We back our products with a superior warranty and superior customer service. If you have any questions about your controller, or have any difficulty using it, please don't hesitate to contact us. We can be reached at (319) 462-3327 from 7:00 AM through 4:00 PM Central Standard Time, Monday through Friday. Or you can email us at service@thomas-superwheel.com and we will respond promptly.

We provide a 30 day money back guarantee, which means that if you are not satisfied with your new controller, you can return it for a full refund minus shipping and handling costs if you return the controller to us within 30 days of receiving it.

Our warranty is the best in the industry. We back the controller with a lifetime warranty which excludes only the potentiometers. Potentiometers, are the electronic components which convert the mechanical rotation of the steering wheel or pedals into a resistance which the computer can read. They do have a limited life expectancy, and will need to be replaced periodically. With that in mind, we offer replacement potentiometers at affordable prices, and we make them easy for you to replace in the controller without needing to solder (see the section in the back of this manual on potentiometer replacement for instructions). We do cover new potentiometers for a period of 90 days to protect you from getting a "lemon". The potentiometers in your controller should last at least 6 months with constant use, and the higher grade SPEC potentiometers should last one to two years.

If you ever encounter problems with your controller, you should contact us to see about getting replacement parts, or if necessary, you may need to send your controller in for service. Please be sure to contact us before sending your controller to be serviced.

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When unpacking the controller, the first thing you should do is locate all of the accessories and miscellaneous parts. These are usually taped to the inside flap at the top of the box with this user's guide and your invoice. Be sure to keep track of these parts and don't lose them among the packing material. At the very least, you will find the clamp, which is an L-shaped metal bracket with a bolt in one end. You may also find adapters, extension cables, and any spare potentiometers that you ordered with your controller

Once you've laid the accessories aside out of harms way, you can proceed with unpacking the wheel and pedals. Depending on the controller model, some assembly may be required to fasten the steering wheel to the controller base. If your steering wheel is separate from the wheel controller, see below for assembly instructions.

With your controller unpackaged, it is a good idea to check it over for shipping damage. We package the controllers as securely as possible, but occasionally they may incur damage due to rough handling during shipping. If you find anything broken or cracked, be sure to contact us immediately so that we can remedy the situation.

Attaching the Steering Wheel:

If you find the steering wheel unattached in the box, then follow these steps to properly attach it to the controller. First, you will need two 7/16" (or 11mm) wrenches. You will also need a flat screwdriver. Locate the plastic bag which contains the black plastic center cap, it will also contain the hardware necessary to fasten the steering wheel. See the illustration below for the proper arrangement of the hardware.

When aligning the steering wheel, you will see a punch mark on the end of the steering shaft. Center the punch mark inside the 1/4" hole in the center of the steering wheel for proper alignment. When tightening the nuts to secure the steering wheel, you want to be sure the wheel is straight before you completely tighten the nuts. You should also be careful of any wiring that is inside the wheel. Do not tighten the nuts down on the wiring. When you're confident of proper alignment, tighten the nuts very tightly using your 7/16" wrenches so that the wheel will not work loose.

STEERING SHAFT

13" WHEEL
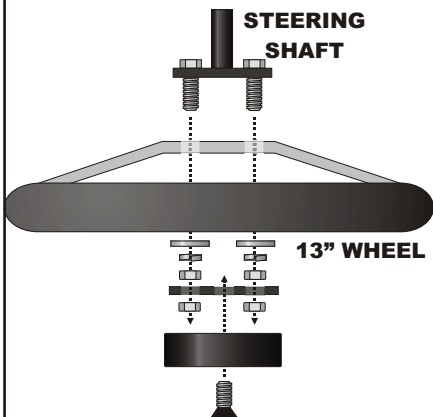
After securing the wheel, put the rectangular black plastic bracket onto the bolts, and look through the center hole to align it with the hole in the steering wheel. You may need to turn the bracket over and end for end to get the holes to line up. Once you have properly aligned the center hole in the bracket, secure it with the two remaining nuts. Finally, fasten the plastic cap onto the bracket using the flat head screw.

If your wheel has buttons, you'll need to connect the modular jack from the coiled cable to the back of the steering wheel. The jack may press in hard, but make sure you hear it click into place. If you need to remove the wheel for any reason, just unplug the modular jack to disconnect it. If it sticks, use a small flat screwdriver to gently pry it out of the socket.

Keeping your steering wheel looking like new:

The rubber compound we use on our wheels has a nice glossy look, and it's very durable, but it will collect dust if left unused for any length of time. We've found that the best way to keep it looking and feeling new is to periodically wipe it down with any household furniture polish. The same thing will work for the plastic covers.

Clamping your TSW2 to your desk
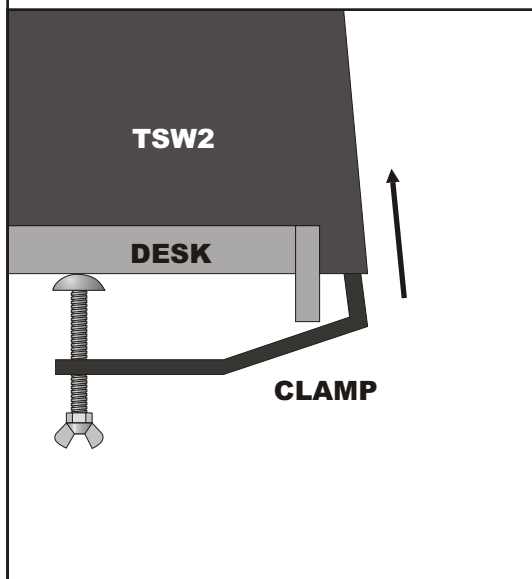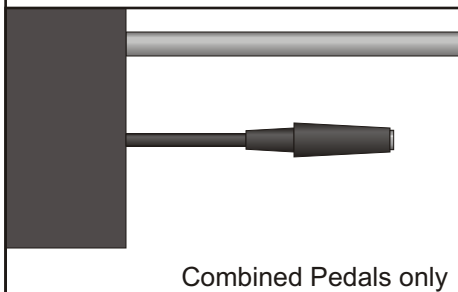

TSW2

DESK

CLAMP

Set your TSW2 steering controller on your desk with the small front lip against the front edge of your desktop. Locate the L-shaped clamp, back the thumb screw off several turns, then insert the clamp into the metal tube on the front of your steering controller, just below the steering shaft. Make sure the clamp fits fully into the clamp tube, if it doesn't you may need to back the thumb screw off further. If your desk is especially thick, you may find that you cannot insert the clamp fully. In that case, you may need to contact us to see about having a custom clamp made. With the clamp fully inserted, reach underneath your desk and tighten the thumb screw. You should not try to tighten the screw to the point of straining the clamp, as this can shorten the life of the clamp by ruining the threads and mar the underside of your desk. Simply snugging the clamp bolt, should be sufficient to secure the wheel.

Connecting your Pedal Controller

With the steering wheel now fastened securely to your desk, set your pedal controller under your desk, at a comfortable distance from your chair. Be sure to route the connecting cable(s) in such a way as to keep them from getting in the way of the moving pedals.   Connecting your pedal controller properly may not be as simple as just plugging in the cables. Depending on the configuration of your controller, there may be more than one way to connect your pedals, which will determine how the pedals behave within the simulation software.

 First, you will need to determine the capabilities of your controller. The illustrations below show the two possible configurations, they represent the socket cables which are located on the right front corner of your steering controller. The one on the left represents a TSW2 without split pedal axis capability which will only allow your pedals to be calibrated together on one axis. While fully functional, a combined axis controller won't allow for maximum realism, though it will work with a greater variety of sim-racing games, and is easiest to set up.
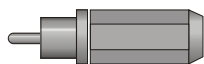

Combined Pedals only
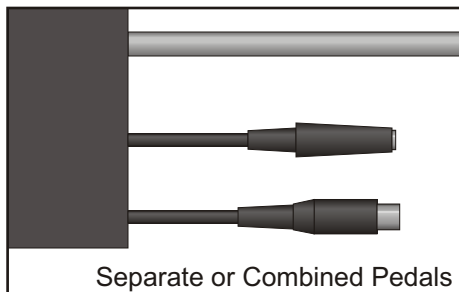
Separate or Combined Pedals

Section 2: Unpacking the controller and initial setup

The illustration on the lower right of the previous page shows a TSW2 controller which is equipped with a single/dual adapter kit. Notice that there are two black socket cables instead of only one. If your controller has the two socket cables as pictured on the right, then it will come with a plastic bag containing the black RCA to Stereo adapter cable (below right). If your controller has a clutch pedal, then the adapter cable is the only part that you will have in the bag, however, if you have single/dual capability, but no clutch pedal, then you will also find a small red RCA plug (below left). This plug contains a resistor which allows Windows to see it as if you have an additional pedal axis, thus taking the place of a clutch pedal. This resistor is necessary for split axis mode to be recognized by Windows, so do not lose it.

Red Resistor Plug   Black RCA to Stereo Adapter Cable

The adapter cable is used to convert the controller to combined pedal axis mode, which is necessary with some games, so don't lose it either. Use the following illustrations as a guide to plugging in your pedal controller. The text on the bottom right of each illustration provides the correct configuration info for setting up the controller in windows using the Custom config tool (only necessary when plugging into a gameport, not with the USB adapter). More information on setting up the controller in Windows is provided in the following sections.
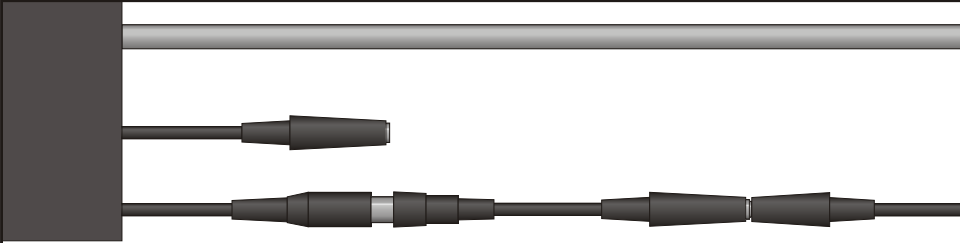
Combined Pedal Axis Only
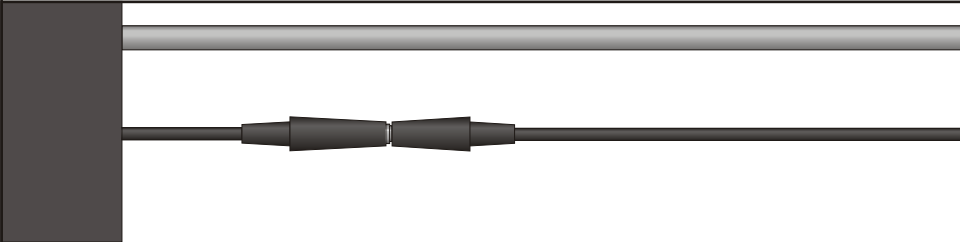
Windows Config: 2 axis, 2 or 4 button, Race Car Controller

This is the simplest to configure, just plug the pedal cable into the socket in the steering wheel, and you're ready to move on to the next section.
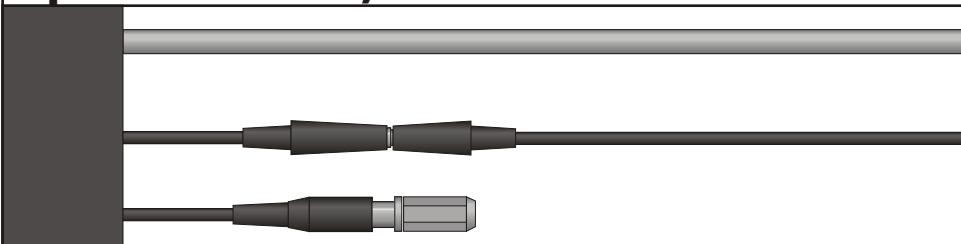
Combined Pedal Axis

Windows Config: 2 axis, 2 or 4 button, Race Car Controller

If you have split axis pedal capability, but need to use the pedals on a combined axis, use the adapter cable as pictured above. This mode will work with all games.
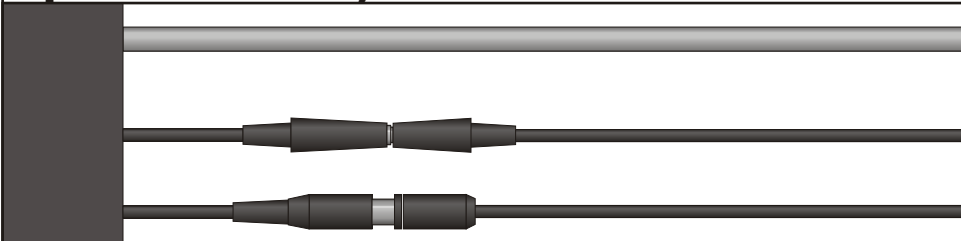
Separate Pedal Axes, No Clutch

Windows Config: 4 axis, 2 or 4 button, Race Car Controller

Connect your pedals as pictured above if you want split pedal axes, and don't have a clutch pedal. Split pedals will provide the most realism, allowing games to read each pedal independently, which affects how your car behaves when both pedals are pressed at the same time. This mode isn't fully supported in all sims, so if you have difficulties, you should use the combined mode pictured on the bottom of the previous page.

Separate Pedal Axes, with Clutch

Windows Config: 4 axis, 2 or 4 button, Race Car Controller

If you have a clutch pedal, and want to use it, you must connect your controller as pictured above. This mode provides 3 separate pedal axes, which is the most realistic (see explanation above). Not all games will support a clutch pedal, you can also assign your clutch to be the brake pedal if you prefer a wider pedal stance.

Connecting the controller to your PC

The next step to setting up your controller is to connect it to your PC. If your computer has a game port, you simply plug the beige cable from the right side of your steering controller into the back of your computer. The game port is usually found on the sound card slot next to your speaker connections. If you find the cable too short (it's only approximately 4 feet long), you may need to use an extension cable. We offer a 6' long DB15 extension cable, these are often hard to find at your local computer store, so you may want to get it from us.
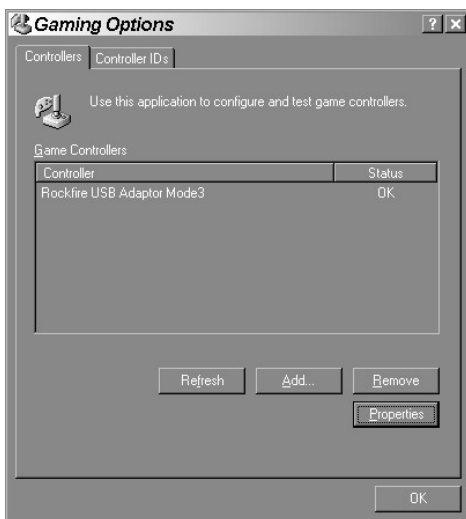
Using the Rockfire USB adapter

Because game ports are not as common as they once were, and due to some compatibility issues with the latest versions of Windows, we carry the 15 pin to USB adapter from Rockfire. There are some other adapters available, but the Rockfire adapter is the best we've found. If you get one of these adapters, you will need to be sure your potentiometers are compatible. You need 250k ohm pots, or **if you use the 50k ohm SPEC pots, you will need the SPEC converter that we manufacture**.

To connect using the USB adapter, simply plug your TSW2 into the adapter, set it to **MODE 3**, then plug the adapter into your USB port. The computer will auto-detect the adapter, and it will be displayed in your gaming options panel. The description in the gaming options panel will vary depending on your operating system. Don't try to remove the configuration manually, it will be removed when you unplug the adapter.

When using the USB adapter it isn't necessary to create a custom configuration in the Windows gaming options panel. As long as you set the adapter to use MODE 3, it will recognize up to 4 axes on your controller.

The USB adapter comes with a driver disk, do not install the drivers from the disk unless you are using Windows 95

Gaming Options   ? X

Controllers | Controller IDs

Use this application to configure and test game controllers.

Game Controllers

Controller	Status
Rockfire USB Adaptor Mode3	OK

Refresh   Add...   Remove

Properties

OK

Note to VIA Chipset Users:

The Rockfire USB adapter experiences a periodic disconnecting problem if used on VIA chipset motherboards. Download the fix from our website in the NEWS section.
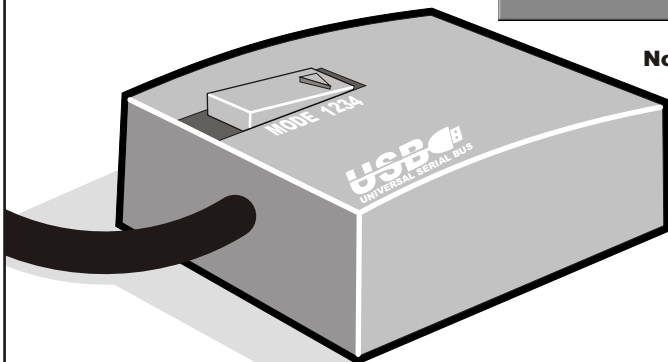
Set the USB Adapter to MODE 3

Setting up your TSW2 in Windows

For your controller to be properly recognized in your games, you will first need to configure it under the Windows Gaming Options Panel. You can find the link to it in your control panel. The screens shown here represent Windows 98, but all versions of windows are very similar with respect to the game controller options and you should be able to follow along without difficulty.

It is important to recognize the difference between connecting via your game port versus connecting via the USB adapter. If you are using the Rockfire USB adapter, you will not need to create a custom configuration. Instead, you can skip ahead to the the calibration process in Step 5.

Figure 1

1. If you are connecting to your game port, then start by emptying out your list of active configurations. If you have any joysticks or other controllers listed here, it will cause you to get a Not Connected status for your TSW2 or else it will not be seen in your games. It is possible in some games to use more than one controller, for example, you might want to use another steering wheel with your TSW2 pedals. In this case, you will need to have both controllers listed in the gaming options panel for them to be recognized by the game.   To remove unwanted configs from the active menu, just click to highlight them, then click on the Remove Button. If any of the controllers are USB, you will need to unplug them, using the Remove button will not get rid of USB devices. Once the list is empty, you should click on ADD. (Figure 1)

2. In the Add menu, you will need to locate and click the Custom button (Figure 2). If your list of inactive controllers on this screen is getting too long or you've created some unnecessary ones, you can remove the unneeded configs by clicking them with your mouse cursor and hitting the delete key on your keyboard. There are, however, several default configs that you cannot remove in this manner.

Figure 2

Figure 3

3. In the Custom Controller menu (figure 3), you will have several options to choose from. The options you select here will depend on the configuration of your controller. Use the illustrations from the
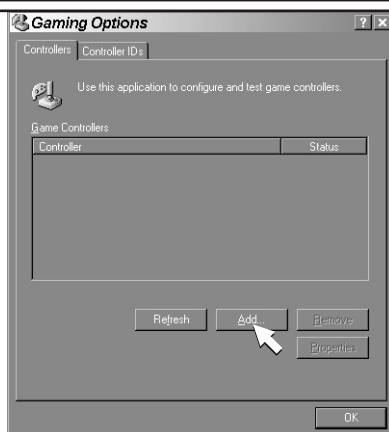
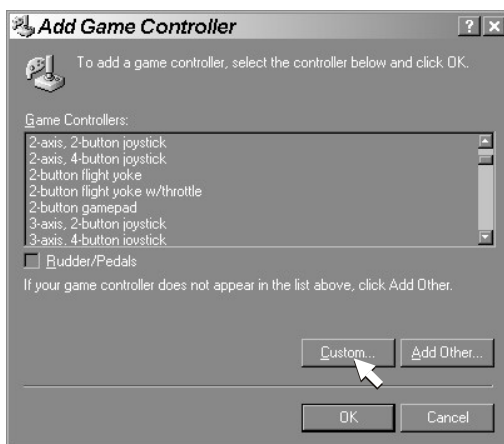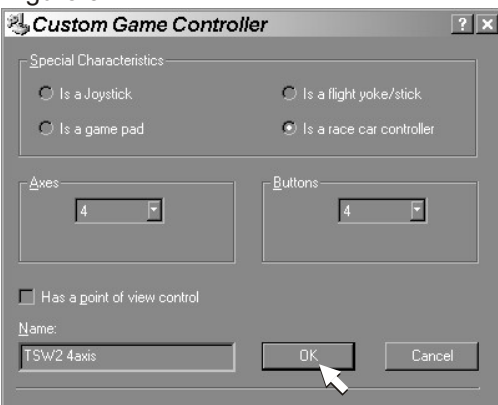earlier section on connecting your pedals, to determine the correct settings for your particular controller configuration. Use the pull down menus and radio buttons to make your selections, then enter a descriptive name in the NAME field. If you are unsure of the number of buttons on your controller, just select 4 buttons, as it will work regardless of how many buttons you actually have. Once you've made your selections, click the OK button, which will return you to the Add menu, click OK one more time to return to the main menu.

4. Your controller should now be listed in the Gaming options menu by itself (figure 4). If you selected the correct options in step 3 for your controller configuration, you should get an OK status on the right. If you see Not Connected here, then you have either selected the wrong settings, or you have the pedals connected incorrectly. If you are sure it's correct, and still get a Not Connected status, your game port may not be configured properly, or you may have something wrong with your controller. You will need to contact us for additional help.

5. Once you've got an OK status, you are ready to calibrate. Start by clicking the Properties button on the main menu, which will immediately take you to the Test Tab. You need to click the Settings Tab at the top (figure 5). To begin Calibrating, Click the Calibrate Button.

6. If you have Windows XP, you will see an announcement page that tells you that you have started the calibration wizard. Simply click on OK or Next, to advance past this screen. Once the calibration process begins, you first need to set the center position of your controller. If you are using the Rockfire USB adapter, you will notice that the text instructions on the screen will refer to a joystick. Do not be concerned with this as it doesn't make any difference. Leave your wheel alone and press either a button, or the shift lever to advance. (Figure 6)
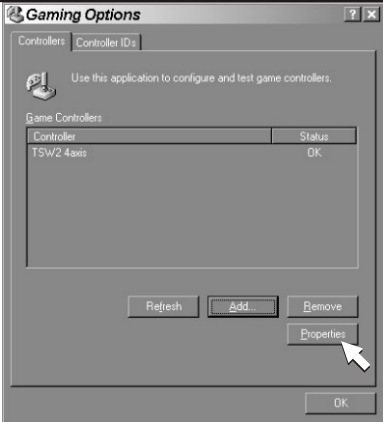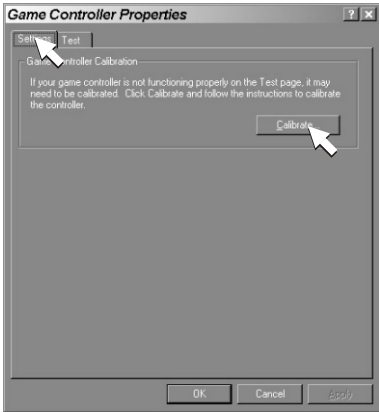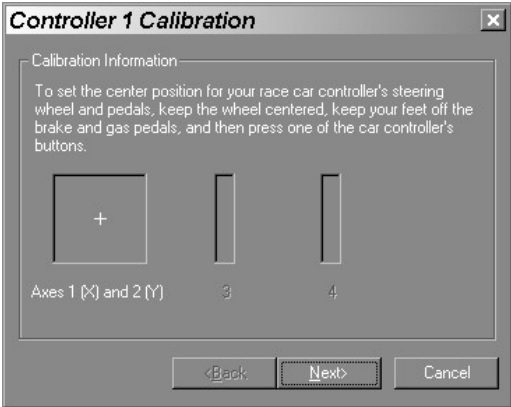
Figure 4.

Figure 5.

Figure 6.

7. This step will vary depending on your controller configuration.
If you have your controller set up as a 2 axis config, you can follow the on-screen instructions (Figure 7), steer fully left and right, then press your gas and brake one at a time. You should see the cross-hair move to correspond to your controller inputs. Don't worry if it doesn't move all the way to the edges of the box, that's normal.
If your controller is using a 4 axis config, then you won't press the gas and brake on this step (you still steer left and right), instead, if you have a clutch, you press it now, which will move the cross hair vertically. If you don't have a clutch, then you just steer left and right. Press your button or the shift lever to advance.
It is important during the calibration **not** to use your mouse to advance through the steps by clicking the NEXT button. Doing so will not calibrate the controller properly.

8. This step is simply confirming the wheel center once more. Simply press a button or your shifter to advance. (Figure 8)

9. If you are using a 2 axis config, and your controller is connected via the game port, then you are finished calibrating. You click the finish button with your mouse and you can skip ahead to step 11.

If you are using a USB adapter, you will always be prompted to calibrate the 3rd and 4th axes regardless of whether your controller is using them. If you aren't using split axis pedals, then just press your button or shifter to advance past these screens. (Figure's 9 and 10). **If your controller is using split axis pedals, then you will need to calibrate your gas and brake in this step.** The first screen (Figure 9) prompts you for axis 3, this should correspond to the gas pedal. Press it once or twice, then advance by pressing a button or your shifter. The next screen prompts you for axis 4, this is your brake. Press it, and then a button or your shifter to finish. Click the Finish button with your mouse to conclude calibration.

10. After you finish calibrating you should be taken back to the Test Tab. If not, simply click on the TEST tab at the top of the screen. Here you will see a
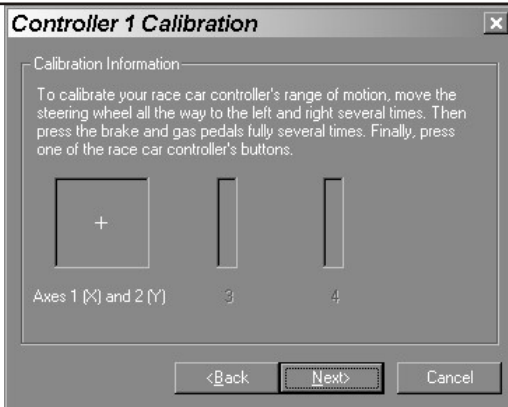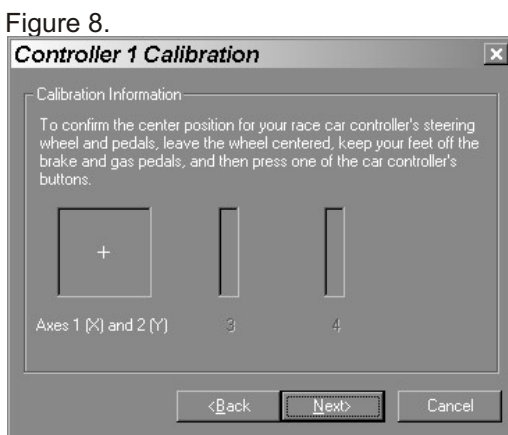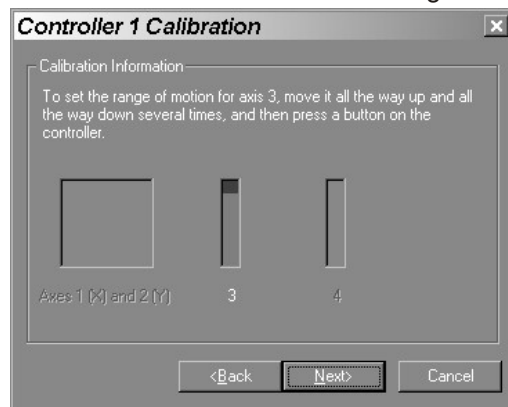

Figure 7.

Figure 8.

Figure 9.

representation of your controller's axes and buttons. (Figure 11) You can test whether everything is functioning properly now. Don't be concerned if you see the cross hair jump up and down on this screen as that axis doesn't calibrate when you use split axis pedals. With a clutch it may jump to the top of the box, since Windows expects this axis to be 2 sided (as with combined pedals).

11. If you use Windows XP or 2000, you can simply click OK twice to close out the Gaming Options Panel. If you use Windows 98 or ME, you will want to ensure that the Poll with interrupts box is UNCHECKED. This is important, as having it checked often causes erratic calibration. To verify that it is unchecked, click OK to go back to the main screen, then click the Controller ID's Tab. (Figure 12) At the bottom of this screen is the Poll With Interrupts box. If it has a check mark in it, click on the box to uncheck it. Once you have done so, just click OK and you are finished setting up the controller in Windows.
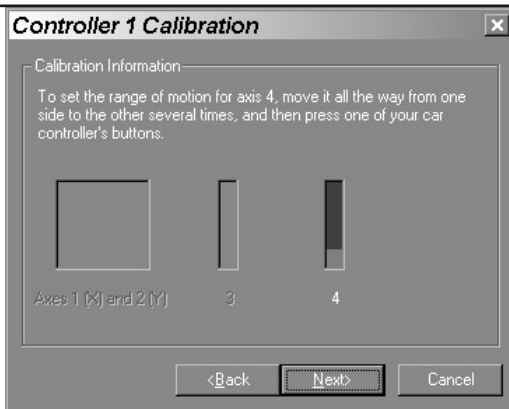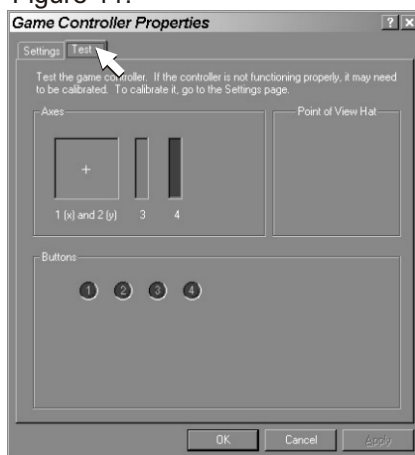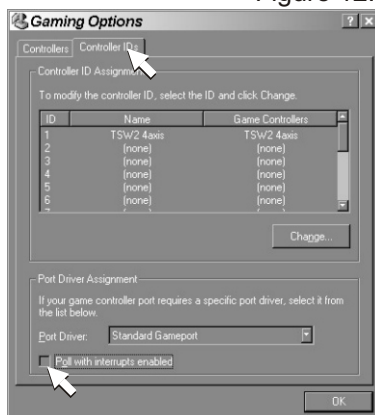

Figure 10.

Figure 11.

Figure 12.

If you're into stock car racing, Nascar Racing 2003 by Papyrus is the premier racing game available (as of the writing of this manual). With realistic physics, terrific graphics and sound, it's the most authentic and enjoyable stock car experience you can get outside the real thing.

To set up your TSW2 controller with Nascar 2K3, you should make sure that you've gone through the Windows setup first. Nascar 2k3 is a sim which takes full advantage of separate gas and brake functionality, and can utilize a clutch pedal as well, so if you have those options on your controller, make sure you set your controller up to use them.

Once you boot up the game, you may be taken directly to the calibration screen (figure 3), if not, you need to click the OPTIONS button from the initial startup screen (figure 1), and then select the CONTROLS tab (figure 2). Make sure you select the Direct Input Driver option (figure 2), then press Calibrate.

The Calibration screen (figure 3) will show 4 calibration axes, with a small arrowhead on each. Begin calibrating by turning your steering wheel fully left then right one time. You should see one of the calibration axes move left and right to correspond to your input. Next, press the gas pedal, and then the brake. If your controller is configured as a **2 axis config**, you will see the axis move to one end with one pedal and to the opposite end with the other, returning to center when you release both pedals. If your controller has **separate gas and brake** functionality, the gas will operate one axis, and the brake another, both will move their corresponding axis to the end when pressed, and return to the opposite end when neutral. If you have a clutch pedal, press it down to calibrate the remaining axis.

Don't be concerned with the listed assignments to the left of the calibration bars, as these will only show what was last assigned to them. After you've calibrated all of your axes, click on OK.
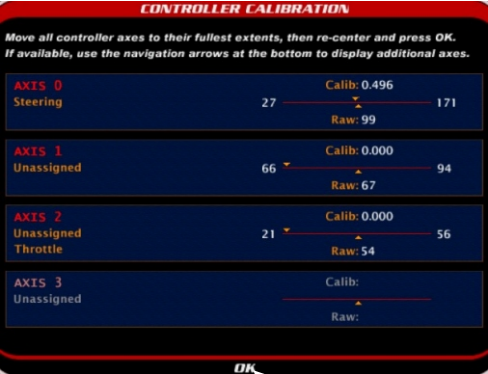
Figure 2.

Figure 3.

Figure 1.

The next step is to assign your control inputs. The section for this is on the left side of the screen (Figures 4, 5, and 6). Begin with the steering, click the word Steering with your mouse, then when prompted to steer to the left, turn your steering wheel left. The prompt should go away and you will see an axis designation to the right of the word Steering. Follow the same procedure for each of the input options. If your controller doesn't have enough buttons/pedals for all functions, you can assign the unnecessary functions to keyboard keys, or leave them on the default setting. The assignments you get will not necessarily match those in figure 4.

Figure 4.

When you come to the Gearbox section, be sure that you've marked the option for sequential. (Figure 5)

Figure 5.

To get to the rest of the options click the Advanced button next to the control assignments section (Figure 7), You will see 3 sliders labeled input momentum (Figure 8), leave these at 0%, they are used for digital inputs like the keyboard or a gamepad, and will not have useful affects on your wheel and pedals.

Figure 6.

Figure 7.

Steering assistance (Figure 8) should be left at 0% at most tracks, though it will make driving a bit easier to use a low percentage. We actually recommend using about 15 to 20% steering assistance at restrictor plate tracks due to the difficult nature of driving in 2 and 3 wide situations.

Figure 8.

You'll want to adjust the steering linearity based on your own personal preference, however we recommend using a high percentage anywhere from 80 to 100% (Figure 10). The linearity affects the sensitivity of the wheel in the center. The lower the setting the more steering deflection you need to make the car begin to move. Too low a setting will result in a dead spot in your steering. If you find the controller to be oversensitive, we recommend adjusting the steering ratio setting to a higher number within the individual car setup. That will slow down the steering without creating a dead spot. Try using the highest number for the steering ratio as the track will allow, short tracks and road courses need a lower number to give the car a tight enough turning radius to make it through the corners.

Figure 9.

Figure 10.

Lastly, you should turn off all driver aids (Figure 11.). Automatic clutch will default to being on if you don't have a clutch pedal assigned.
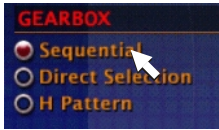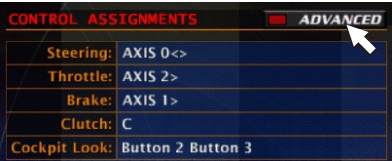

Figure 11.

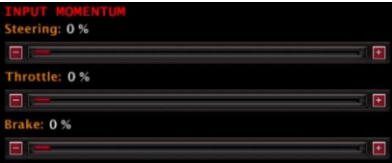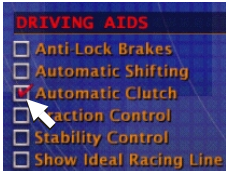Grand Prix Legends, or GPL for short, is arguably the best racing sim available. Released in 1998, it still holds up today because of its advanced physics engine, and the extensive user modifications that are downloadable (and free) on the internet. No other driving game we've seen offers as exciting and enjoyable a racing experience with as high a degree of car control. This isn't for the arcade racer, it's hard core, and can take a while to get used to driving, but it has the potential to create an incredibly realistic driving experience once you learn to handle the tricky characteristics of these zero-downforce, high horsepower cars. Besides the original handful of tracks (which include an amazing 14 mile long track, the original Nurburgring), users have created more than 100 add-on tracks and many tracks converted from other sims.

Besides being a great game, GPL is incredibly easy to set up your controller with. Like all Papyrus sims, it's not actually necessary to fully calibrate your controller in windows prior to setting it up in the game. You only need to make sure that your controller has the correct configuration of axes and buttons with an OK status under the windows game controller app. All calibration is done within the game itself. Papyrus sims also support more than one controller connected to your PC at once. This allows you to use an H-pattern shifter, and you can mix and match pedal and wheel controllers.

Figure 1.
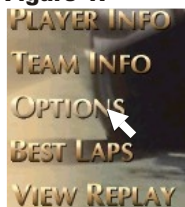
Figure 2.

After booting up the game, click Options to get to the setup menu. (Figure 1) If you're not already on the controller page, use the arrows at the bottom of the screen to change over to the controller menu.

Figure 3.
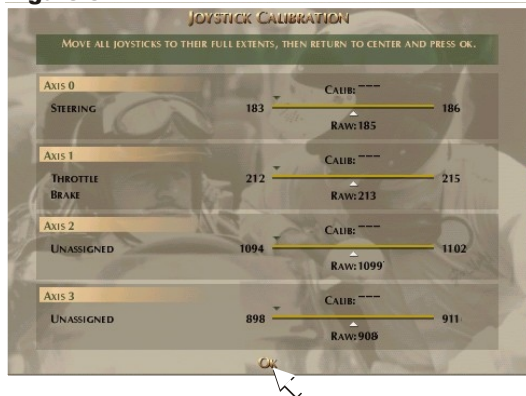
Once you're at the controller menu, make certain you have the joystick driver assigned to **Direct Input**. (Figure 2) The Generic driver will work on windows 98 or Windows ME operating systems with a Pentium PC, but will usually give you a more jittery response from the controller than the Direct Input Driver.

Next click Calibrate Joystick(s). This will bring up the axis calibration screen. You should see 4 horizontal bars each with a triangular pointer indicating the control position. (Figure 3) If you are using multiple controllers, you will see arrows at the bottom of the screen allowing you to switch to the next page of axes.

To calibrate your controller, simply steer fully left then right, and then press each pedal one at a time. You should see movement on the corresponding axes when you move your controller. If you are using split axis pedals, all pedals will reside on their own individual axis. If you have your gas and brake operating combined, you will see them both on one axis.

Don't pay too much attention to the control that is designated to each axis on the left side of the window. Those will probably not be correct until you've assigned your controls in the following steps.

After you've finished moving your control inputs, click on OK. Now you're ready to assign the control inputs. In the upper left part of the screen you will see the section that says SET CONTROLS. Here you want to click each control on the right side, one at a time. When you click a control, you will then be prompted to move your controller, when you do, the prompt will go away, and you will see an axis or button designation on the right side. Your settings may not match those in Figure 4, but don't worry, they will vary depending on your controller's configuration.

Figure 4.

The Steering Linearity affects the sensitivity of your steering controller. This is adjustable by moving the slider left or right. (Figure 5) To the far left, the controller will have maximum sensitivity, while at the far right, it will have a dead zone. We recommend a high linearity setting (far left) for the highest degree of car control, though you may tend to notice some jitter in the visible steering wheel if you set it to 100% (you can turn off the visible steering wheel and driver arms in the graphics settings).

Figure 5.
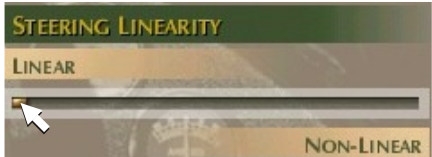
Electronic Arts' F1 2002 is, in our opinion, the best modern Formula One Sim available. It sports the best graphics of any sim to date, has excellent sound and physics, and user mods are upcoming, some already available, to expand the sim to other types of cars.

What it lacks however is a good control setup routine like all of Papyrus' sims have. The EA F1 games have always suffered from overly complicated, poorly implemented control setup routines, which don't have in-game calibration. For the most part, combined axis implementation is pretty easy. Where you run into problems is when you want to use split axis pedals.

Figure 1.
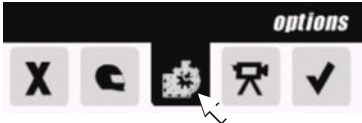
The first thing you must do is ensure that your controller is fully calibrated under windows first (see section 3). If you have split axis capability on your controller, you should attempt first to set it up in split mode, as the game will support it in some cases.

After booting up the game, click on the stopwatch icon at the bottom right to bring up the game options screen. (Figure 1)

Figure 2.

From the options screen, click the joystick icon (Figure 2). That will bring up your control assignments menu (Figure 3).

Figure 3.

If you've calibrated your controller in windows, all you should need to do is click each action on the left, and when prompted, activate the corresponding controller input. Be aware that there is a scroll bar on the right of the menu, which you will need to use to get to all of the available actions.

Here is where the problems sometimes come into play. First, you may find that an input is selected before you have an opportunity to touch the controller. If that is

Figure 4.

happening, the only solution is to be persistent and quick. You need to click the action with your mouse, then as quickly as possible, activate the control. If it worked you can tell by looking at the axis indicator on the left side (Figure 4). The top horizontal bar represents the steering and should turn red when you steer left and right. The other bars each represent a pedal and should turn red when you press the corresponding pedal on your controller. If they are correct, you should see the bar fill with red as you press down the pedal. If the bars are flickering, or simply not responding, you don't have the right input assigned.

Section 4: Calibration and In-Game Setup

Once you have the inputs assigned correctly, you need to test them on the track. Sometimes you can get everything set up correctly but on track you'll find that one of the pedals doesn't work at all. This appears to be some sort of bug in the game, but it doesn't affect every computer. If you can't make it work, you're pretty much relegated to playing this game with your controller set up in combined pedal axis mode.

If you've got the controller working, the final steps are to adjust the controller so that it feels right to you. This can take some time to get right because there are so many adjustments to make. The first settings to experiment with are the dead zone settings. To get to these, again go into the options menu (stop watch icon), then into controls (joystick icon), and then into the controller 1 settings menu (joystick with #1, Figure 5). Here you will find several sliders for sensitivity and dead zone adjustments (scroll down to find the dead zones). The X axis is the main one to be concerned with as it affects the steering. We recommend setting this to 0% so that the car will react with the slightest movement of the wheel. It's probably best to leave the pedals at their defaults, but feel free to experiment.

Sensitivity adjustments are where the most time can be spent. Increasing the sensitivity will make the car more responsive, but may make it too twitchy to drive. You simply need to tweak these till you find a setting that suits your style.

Figure 5.

Figure 6.

Figure 7.

Figure 8.

Here are some general tips. One of the problems people first encounter with this game is the pit road limiter. If you don't leave pit control to the computer, you will need to toggle the speed limiter off and on manually. The default control is L. If you don't know to use this, you won't be able to get the car to come up to speed.

Another tip: turn clutch assistance on in the difficulty options (Figures 7 and 8). You may be tempted to turn this off if you use a clutch, however, if you spin your car you must engage the clutch to keep the car from stalling. It's hard to remember to do this, and there is no apparent way to restart the car except to press escape and go back to the garage. That is pretty annoying, so it's better just to leave the auto clutch turned on, and not have to worry about it.

Finally, we recommend setting anti-lock brake assistance, throttle assistance, and traction control to low. This will save you a lot of headaches. This game is not in the least forgiving in these areas if you turn all help off. The real cars all have these aids now, so it shouldn't hurt your sense of realism to use these. We recommend the low setting because turning them on full will likely slow down your lap times.
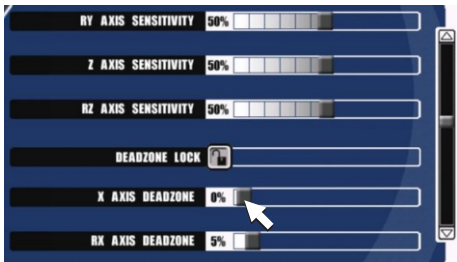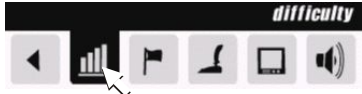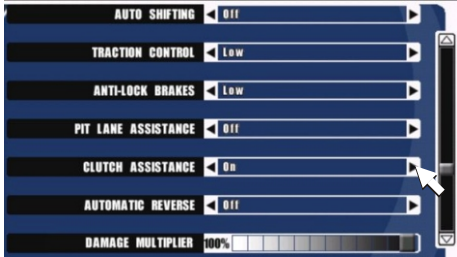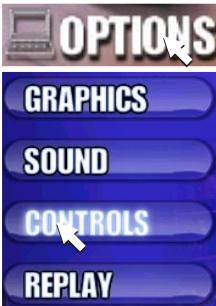
Figure 1.

Figure 2.   **Figure 3.**

While Nascar Heat isn't the best Nascar Sim available, that spot being reserved for Nascar 2003 by Papyrus, it does have it's good points. The main one being tons of available user modifications, turning it into any kind of racing game imaginable from dirt cars to touring cars, you name it.

Nascar Heat does suffer from a finicky setup routine that relies on windows for it's calibration. That means that it may not work in split axis mode, or it may present difficulties when trying to assign your controls, much like F1 2002.

Make sure your controller is calibrated in windows, then after booting the game, click on options (Figure 1). Then select Controls from the menu to bring up the basic controls screen. Here you will see the control assignments listing (Figure 3). Click each control on the left one at a time, and you will be prompted to activate the corresponding control input. When they are assigned correctly you will see the red bars and the wheel indicator move in relation to your controller inputs.

After assigning the controls, click the ADVANCED option (Figure 4). This will bring up a screen with a number of optional adjustments (Figure 5). The most important adjustments are the dead spot and non-linear settings for the steering. Make sure dead spot and non-linear are all the way off (fully left).

Figure 4.
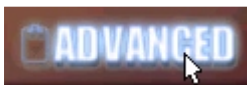
It is also a good idea to put a small amount of dead spot and overshoot into the pedals, as this will ensure you get full throttle and brake when on the track.

Lastly, Nascar heat provides a couple options for cleaning up the jitter that the controller usually creates. These are Supersampling and Smoothing. Turn these options on for best results.

Figure 5.   **Figure 6.**

Potentiometer Replacement

Tools Required:

2x 1/2"   7/16" Nut Driver   1/8" Allen Wrench   Small Straight Screwdriver   Medium Phillips
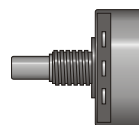
A potentiometer is a device which translates mechanical rotation into variable resistance. The computer can read the variable resistance and translate that into a change in the steering, brake, or throttle in the game. There is one potentiometer in the steering controller, and one for each pedal for a maximum of 4 potentiometers, if your controller has a clutch pedal.

Medium Grade DK Potentiometer

Potentiometers don't last forever, they do have a wear factor, and will eventually need to be replaced. The most common symptom of a failing potentiometer is when you experience erratic calibration behavior and/or twitchy behavior on-track. On average you can expect to get 6 months to 1 year out of the medium grade DK potentiometers, and about 1 to 2 years out of the high grade SPEC potentiometers with heavy use.

With this in mind, we've designed our controllers so that replacing potentiometers is as easy as possible, and we've provided you with a detailed guide to show you how to change them out. With the right tools, anyone should be able to replace the potentiometers when the time comes.

High Grade SPEC Potentiometer

To get at the potentiometers you first need to remove the plastic cover(s). The steering cover is held on by 5 phillips head screws. Remove these, and also unscrew the shift knob to remove the cover.

The Pedal cover is held on by 4 phillips screws, but you also need to remove the pedal pads before the cover can be removed. To do this, you need two 1/2" wrenches. Use one wrench to hold the nut and the other to loosen the bolt which secures each pedal pad.
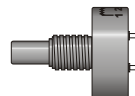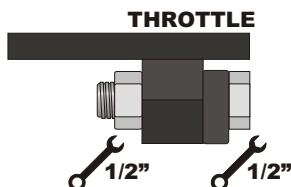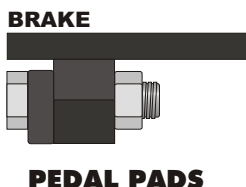
THROTTLE   **BRAKE**   **CLUTCH**

1/2"   1/2"   **PEDAL PADS**

SPEC Potentiometer Installation in Steering Controller

Orange Rubber Boot

Clear Plastic Tubing

1/2"

7/16"
Nut Driver

Align Potentiometer
with numbers on top

1 2 3

Align Potentiometer Shaft
with arrow mark pointing
at the printed number 2

From
Potentiometer

To Controller

(Potentiometer Wiring viewed from above)

SPEC Potentiometer Installation in Pedal Controller

Leave Minimal Gap

Leave Minimal Gap

THROTTLE

BRAKE

CLUTCH

1/2"

1/2"

1/2"

Pedal

Threaded Rod

Plastic Linkage
Block

Potentiometer
Bracket

Alignment Mark
(see next section)

1/8" Allen Wrench
(Don't tighten yet)

Pull Linkage Blocks Aside
To Adjust Potentiometer
Shafts by Hand. See Next
Section for Proper Settings.

DK Potentiometer Installation in Steering Controller

Orange Rubber Boot

Clear Plastic Tubing

1/2"

7/16"
Nut Driver

Terminals
To Right

Align Slot in Shaft
with Center Terminal

From
Potentiometer

To Controller

(Potentiometer Wiring viewed from above)

DK Potentiometer Installation in Pedal Controller

Leave Minimal Gap

Leave Minimal Gap

THROTTLE

BRAKE

CLUTCH

1/2"

1/2"

1/2"

Pedal

Threaded Rod

Plastic Linkage
Block

Potentiometer
Bracket

Screwdriver Slot
(see next section)

1/8" Allen Wrench
(Don't tighten yet)

**Use Small Straight Screwdriver
To Adjust Potentiometer Shafts**

**See Next Section For
Proper Settings**
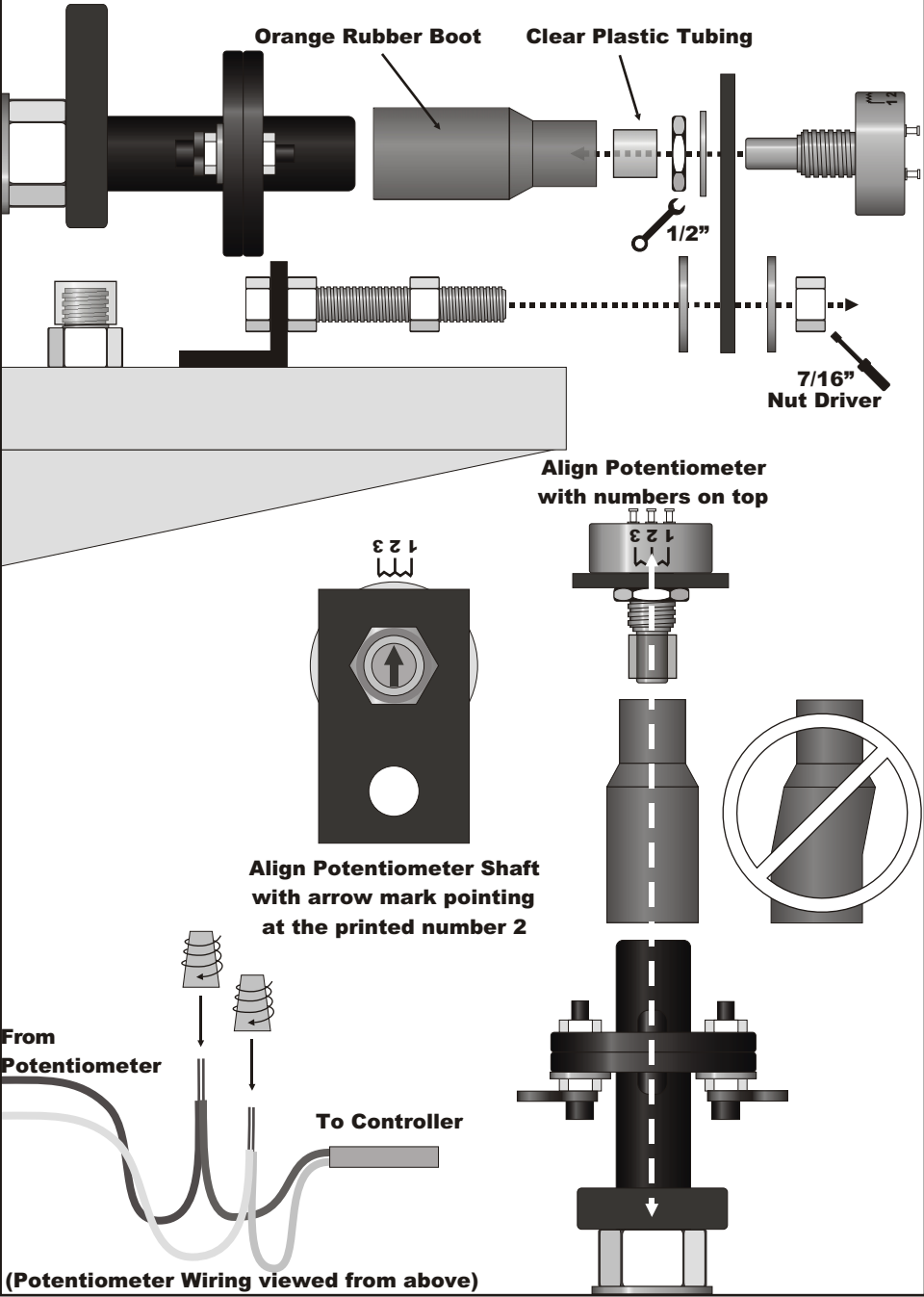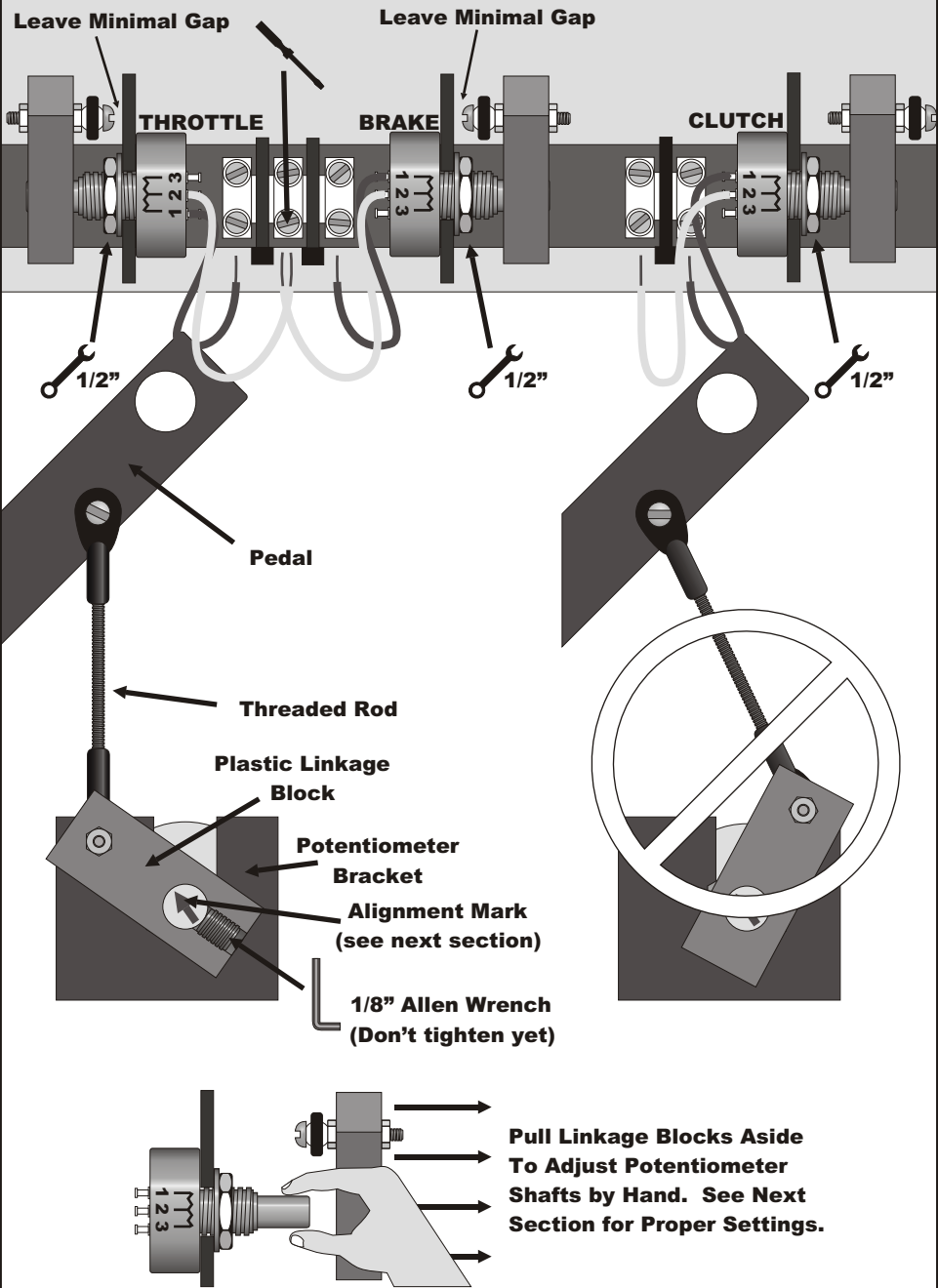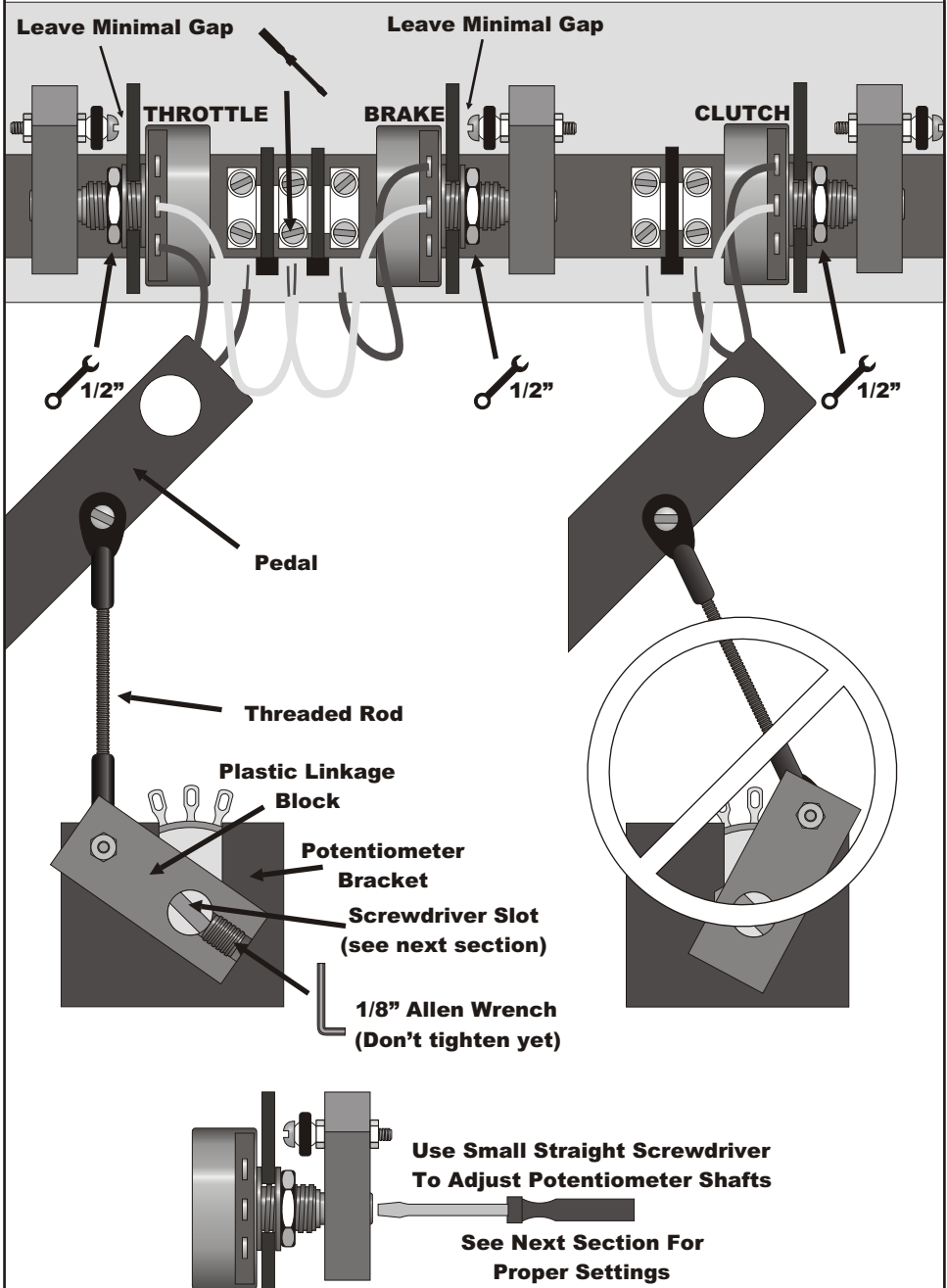
Setting/Adjusting the Steering Potentiometer

After Installing the potentiometers, you will need to make final adjustments to ensure they are set properly. The best way to do this is to connect your controller to the computer and launch a Papyrus sim like Nascar 2002 or Grand Prix Legends. These games have useful in-game calibration screens which give valuable information needed to set the potentiometers. If you don't have one of these games, there are less accurate ways to set the potentiometers which will work but may not be ideal. You can also use a digital ohm-meter to display resistance values of the potentiometers, which is just as useful, if not quite as handy as the in-game calibration routines of the Papyrus sims.

With the steering controller, it is usually not necessary to make much of an adjustment. If you have aligned the potentiometer shaft correctly based on the illustrations in the previous section, either pointing the arrow at the printed number 2 on a SPEC pot, or aligning the slot with the center solder terminal on a DK pot, then you have already placed the potentiometer at it's approximate center, which is what you are trying to achieve while the steering wheel is also at it's center.

Not all DK pots are perfectly linear, in that they may not achieve their exact center resistance when their shaft is physically centered. Some even have more resistance change on one side of their center resistance than the other. This is not overly important as the game will compensate for these conditions when you calibrate, but it is possible to improve this condition somewhat by adjusting the potentiometer shaft to compensate. If you don't have a Papyrus sim to calibrate with, don't worry about this. If you do, then you can follow the instructions below to fine tune the potentiometer setting..

The way you do this is by first examining the calibration values on the steering axis after you have turned the wheel fully left and right. If the raw value (below center of axis) reaches it's minimum value well before you have turned the wheel to it's counter-clockwise stop, then you will want to adjust the potentiometer shaft counter-clockwise. To make this adjustment, grip the orange rubber boot where it fits over the end of the steering shaft, hold the steering wheel with your other hand, and turn the rubber boot counter-clockwise. After this adjustment, you need to click OK to exit the calibration screen and then calibrate again to check that the changes you made produced the desired result. Ideally, the raw value should reach minimum right at the point you are at full left lock on the steering wheel.

You should also check for the opposite condition. When turning the wheel to the right, the raw should reach it's maximum value right at the point when the steering wheel is at full lock. If the maximum raw value is reached before you have turned the wheel to full lock, you should adjust the pot shaft in a clockwise direction, again by turning the orange rubber boot on the steering shaft. It may not be possible for you to achieve both ideal conditions, as some DK potentiometers have a little less travel than others. If this is the case, you should try to achieve a balance by leaving approximately the same amount of dead travel on both sides.

SPEC potentiometers are different than DK pots in that they are generally more linear and therefor center better, but they also have no physical stop to keep them from turning around and around.

Because of the lack of a physical stop, if you have the potentiometer improperly adjusted, meaning the arrow is not pointed at the number 2 when the steering wheel is centered, then you can get the undesirable result of flipping the potentiometer. That means that when you turn the steering wheel the pot travels over the point at which it goes from it's highest resistance to it's lowest, or vise-versa. You will see this in calibration as a large jump in the raw value, going from a high value to a low, or low to high, and afterwards, the indicator will be considerably off-center,

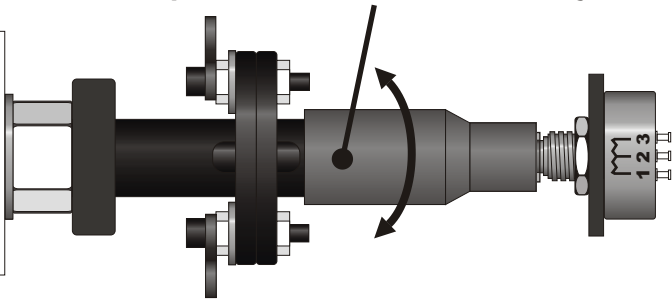**DK POTENTIOMETERS**   **SPEC POTENTIOMETERS**

and will not travel to the ends of the calibration axis when you steer the wheel.   If this flipping does not occur, then no further adjustment is needed. If the potentiometer is flipping when you steer the wheel, then the solution depends on the point at which the flipping occurs.

If the flip occurs close to full left steering lock, you need to turn the potentiometer shaft counter-clockwise.   To make this adjustment, grip the orange rubber boot where it fits over the end of the steering shaft, hold the steering wheel with your other hand, and turn the rubber boot counter-clockwise. After turning the rubber boot, exit the calibration screen then re-calibrate, checking to see if the problem has gone away. If not, repeat the adjustment until the problem is solved.

If the flip occurs close to full right lock, you need to turn the rubber boot clockwise until the problem is gone. Remember to exit and re-calibrate when you make an adjustment.

If the pot is flipping near the center of the travel, then you need to turn the rubber boot 180 degrees, re-calibrate, then if the pot still flips at the end of the travel, use the above instructions to fix it.

Grip Rubber Boot Here and Turn to Adjust

Setting the Pedal Potentiometers

Setting the potentiometers in the pedals is a bit more complicated than the steering controller, begin by situating the controller with the potentiometers closest to you, ideally with the pedal controller on your desk for easy access. It will be best to keep the controller connected to your computer so that you will be able to adjust the pots using a Papyrus sim's calibration screen as a guide.

With the factory potentiometer settings, the USB adapter will not work 100% effectively when the controller is operating with the pedals in combined mode. Using the USB adapter in combined mode with the factory settings will generally result in some dead travel on the brake pedal. If you race with some games that require combined mode, and others that use split mode, you should decide which is the most important to you. You will need to make a compromise. For the best performance using the USB adapter in combined mode, the potentiometers should be re-set using the combined only method detailed below. However, the combined only settings will not work ideally for split axis mode, potentially generating some cross-talk between gas and brake, thus slowing your car down slightly. If you must get the best performance out of games that need to use combined pedals, then it's recommended to use the combined only method, and run all your games using the combined mode. You might sacrifice some realism in games which support split axis pedals, but that is preferable to performance loss.

Combined Mode Only

If your controller is not capable of split axis mode, then use this section to properly adjust your pedal potentiometers. If you adjust your pedal pots using this method, it will be necessary to re-set them using the split axis method if you upgrade your controller with the single/dual adapter down the road.

With DK pots in a combined-mode-only controller, it is not necessary to bring up the calibration screen. Adjust the potentiometer shafts using the physical stop of the pot shaft as your guide. With the brake potentiometer, use a small straight screwdriver to turn the pot shaft counter-clockwise until it stops. Then turn the shaft back clockwise a small amount, not more than 1/8 turn. To lock the brake potentiometer in place, tighten the set screw in the bottom end of the pedal linkage block using a 1/8" allen wrench.

The procedure for the throttle is essentially the same, but it is a bit more difficult because you have to hold down the throttle pedal while adjusting the pot shaft and locking the potentiometer linkage in place. With one hand press down and hold the throttle pedal. With the other hand, turn the potentiometer shaft counter-clockwise using a straight screwdriver until the pot stops turning, then turn it back slightly. Finally, continuing to hold down the throttle pedal, use the 1/8" allen wrench to tighten the set screw in the pedal linkage block. That concludes the procedure for setting DK pots.


Pedal Linkage Block

1/8" Allen Wrench
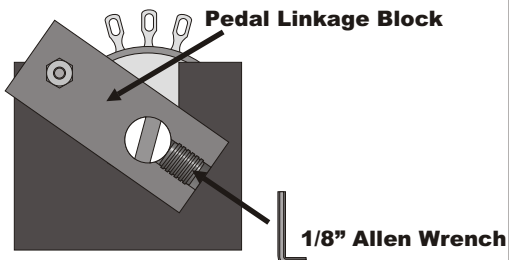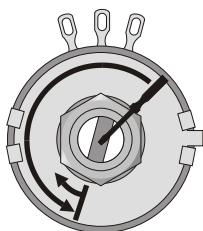
DK POTENTIOMETERS   SPEC POTENTIOMETERS

Combined Mode Only (Continued)

Setting SPEC pots is a little more tricky than DK pots, it's best to have an in-game calibration to judge the overall value of the pots, a digital ohm meter will also work. Begin by aligning both pots with the arrow mark on the end of shaft pointing at the printed number 2 on the body of the potentiometer. If the linkage blocks are pressed onto the pot shafts, pull them aside so you can adjust the shafts with your fingertips. Bring up your game and its calibration screen. Starting with the brake, you need to turn the pot shaft by hand, counter-clockwise till you find the point at which the raw value in calibration makes a significant jump in value. The point at which the jump occurs is the flip-over point, once you locate it, you then want to turn the pot shaft back clockwise a small amount, about 1/8 turn or less, put the linkage block on the pot shaft, and tighten the set screw with the 1/8" allen wrench.

Use basically the same procedure to set the throttle potentiometer, however, after you locate the flip-over point and turn the pot shaft clockwise a small amount, when you put the pedal linkage block back onto the potentiometer shaft, you must first press down and hold the pedal at it's full deflection. Continue to hold down the pedal while you tighten the set screw with the 1/8" allen wrench. You can let up on the pedal after the set screw has been tightened.

 If you can't use an in-game calibration screen, you must judge the settings using the arrow marks on the end of the shafts. This method isn't as precise, but it should work just as well. The illustration below indicates the correct settings of the arrow markings.

THROTTLE   BRAKE
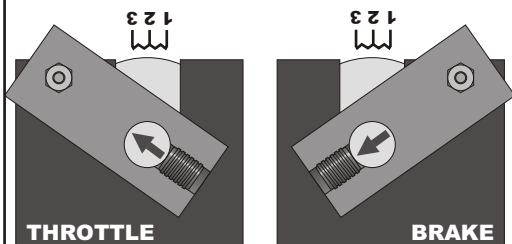
**Setting SPEC Pots manually
without using in-game calibration**

Split Axis Potentiometer Settings

With a controller which has split axis capability you should use the following method for setting the pedal potentiometers. This method is used to set the potentiometers at the factory. Again, it's going to be best to use an in-game calibration, preferably one of the Papyrus sims to gauge the values of the pots. Without this, or a digital ohm-meter, you will not be able to set the pots as accurately, however you can use the arrow markings on the pot shafts to get the settings close to ideal if not perfect. See the illustrations at the end of the section for setting the pots based off the arrow markings.

It can be a bit difficult to explain the proper method for setting the pots using the calibration values. To this end, it's best to understand what you're trying to accomplish by adjusting the pot shafts.

The first thing to be aware of is that when you turn the pot shaft counter-clockwise, you are reducing it's resistance value, and subsequently the raw value on the calibration screen is also reduced, and of course the opposite applies, when you turn it clockwise, the value is increased.

Second, when using split axis mode, we've found that in most cases, having the raw values of the gas and brake reach an equal value will cause interference between the two pots. The affect of that is that some brake will be applied while pressing the gas, and some gas is applied when pressing the brake. Obviously this is to be avoided as it will likely hurt on-track performance.

Finally, it seems to be the case with potentiometers that the higher the resistance value, the more jitter you will experience. Therefor, you want to keep the pots at the lowest resistance values possible, essentially towards the counter-clockwise end of their travel, to minimize jitter.

With these things in mind, use the following procedure to set your DK potentiometers. Bring up your calibration screen. Use a small flat screwdriver to adjust the pot shafts (make sure the set screws are loose in the end of the pedal linkage blocks). Begin with the throttle potentiometer, turn it fully counter-clockwise and take note of the raw value on the axis that corresponds to the throttle. It should reduce to a low number probably below 10. Whatever the value of that number, add 20 to it and that is the number you need to keep in mind (we add 20 to create a safe cushion to prevent the possibility of having any dead travel). Let's assume that the raw number is 7 when the potentiometer shaft is fully counter-clockwise, the number to keep in mind then is 27, which for simplicity, we'll round up to 30. The number 30 is what we want to have as our raw value when the throttle pedal is pressed down.

To get this, press and hold down the gas pedal, then adjust the throttle potentiometer so that the raw value is 30. While continuing to hold down the pedal, tighten the set screw in the end of the pedal linkage block to secure it. You can then release the throttle pedal.

After letting up on the throttle pedal, you now need to take note of the raw value of the throttle axis. Whatever it's value, again, add 20 and this new number will determine the value setting of the brake pedal. Let's assume the raw value of the throttle is 310 when the gas pedal is up, we add 20, so the number to keep in mind is 330. Now, with your screwdriver, adjust the brake pot shaft till the raw value on the brake axis is 330. Once you have that, lock the pedal linkage block in place by tightening the set screw in the end.

If you've done this successfully, using the above numbers as an example (your numbers will be different), there will be a raw of 30 when the gas is pressed, and a raw of 310 when it is neutral. You will have a raw of 330 on the brake when it is neutral, and an undetermined number on the brake when it is pressed, probably around 600 or so based on the numbers we're using in this example. The main thing to note is that the gas reaches a low number when pressed, thus

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Split Axis Potentiometer Settings (continued)

keeping the jitter at it's lowest when you are at full throttle, and also note that there is a bit of a gap between the ranges of the gas and brake, thus keeping them from ever having the same raw value which causes interference between the pedals.

Lastly, if you have a clutch pedal, you will need to set it's pot shaft as well. Use the same raw value as the low value of your throttle pot, in this case 30. Adjust the pot shaft with the screwdriver till the raw value on the clutch axis is 30. Then lock the pot in place by tightening the set screw in the end of the linkage block.

Again, keep in mind that the numbers in this example are only estimates based on our computer, they will differ from computer to computer and potentiometer to potentiometer. The raw values you see on your calibration screen will be derived from the process described, not from the sample numbers we've provided.

Setting the SPEC potentiometers is very much the same as with DK pots, with the main exception being the lack of a stop on the potentiometer shafts. Instead, you must use the flipping point (the point at which the raw value jumps from a low to a high value or vise versa) as a guide.

Begin by pulling the pedal linkage blocks aside so that you can adjust the pot shafts with your fingertips. Then turn the pot shafts till the arrow marks are all pointing at the printed number 2 on the pot body. Bring up your calibration screen, then turn the throttle potentiometer counter-clockwise till you locate the flipping point. Once you do, turn the pot shaft back clockwise slightly to determine the lowest raw value, we'll assume it's 5 for purposes of illustration. Add 20 points to whatever your low value is, and adjust the throttle potentiometer shaft till its raw value is equal to this value, 25 in this instance. Now, press and hold down the gas pedal, press the linkage block onto the pot shaft, and while continuing to hold down the pedal, lock the pot shaft by tightening the set screw in the end of the pedal linkage block.

Now you can let up on the gas pedal. Take note of the raw value of the gas once it is up, we'll estimate 70. Add 20 and adjust the brake pot shaft so it's raw value is equal to this, 90 for this example. Press the pedal linkage block onto the pot shaft and lock it by tightening the set screw in the end of the block.

If you've followed along correctly, you should now see a low number on the raw of the gas when it is depressed, and a gap of 20 between the neutral raw of the gas and the neutral raw of the brake. The brake's raw will increase when you press the brake pedal. So, you should now have the ideal situation: the gas is at minimum when pressed, keeping the jitter at it's lowest when at full throttle, and the ranges for gas and brake are separated so that the two pedals can never have an equal raw value which will prevent interference between the gas and brake.

If your controller has a clutch pedal, adjust the pot shaft till the raw value on the clutch axis is equal to the lowest raw on the throttle axis (25 in our example). Once you have that, lock the pot shaft by tightening the set screw in the linkage block.

Split Axis Potentiometer Settings (Continued)

Setting the Potentiometers without using a calibration screen

If you find the above procedures to be a bit too tough to follow, or you don't have an in-game calibration with raw values, you can use the markings on the pot shafts to adjust the potentiometers. This method is not as accurate, but it will work essentially the same. Follow the illustrations below to determine the proper alignment of the pot shafts.

THROTTLE   BRAKE   CLUTCH
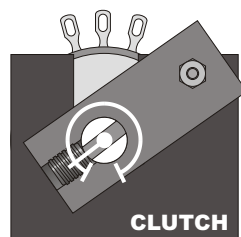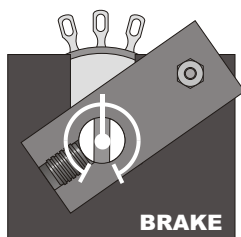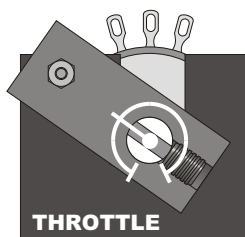
Setting DK Potentiometers Manually without in-game Calibration

THROTTLE   BRAKE   CLUTCH
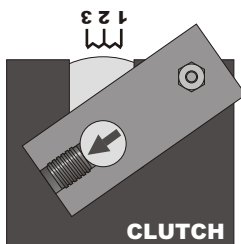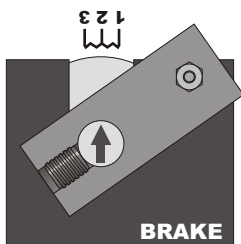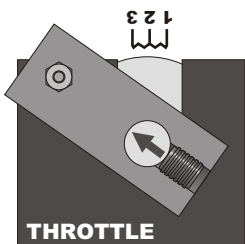
Setting SPEC Potentiometers Manually without in-game Calibration

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